

tion by prismatic ice-crystals at high elevations, the parhelia always appear on the horizontal parheliacal ring which passes through the centre of the sun, and generally at the intersection of this ring with the vertical halo. The two parhelia must therefore always lie in a line parallel to the horizon, and at the same elevation as the sun itself. The same laws regulate the appearance of the paraselenæ or mock moons. It therefore surprised me to learn that the left-hand mock moon appeared at a greater distance from the horizon than the right-hand one. It seemed to me to be "unaccountably out of place." That the circle should have subtended an angle of 50° , as stated by "Sm.," is in itself unusual. The normal diameter is understood to be from 44° to 47° . Did "Sm." actually measure it? To my judgment it was considerably more than this, but of course mere estimates are not trustworthy. I do not see how a "change of level of the refracting cloud" should alter the position of the mock moons. This must depend upon the relative positions of the moon and the observer's eye. If the cloud is not in the right place no mock moons will be seen. I should be glad of a satisfactory explanation of the phenomenon recorded.

Birstal Hill, Leicester, May 7

F. T. MOTT

REFERRING to a letter from Mr. F. T. Mott in NATURE, vol. xxvii, p. 606, I find that at midnight on April 16 the moon's apparent altitude at Leicester was not more than 26° ; so that after allowing for the difficulty of seeing the actual horizon, and taking also into account the breadth of the halo, it seems improbable that the halo observed by Mr. Mott was of unusual size.

I have, however, seen a description somewhere of a *parhelion*—measured with a sextant about the end of last century—which had a semidiameter of 26° . It would be interesting to know whether such irregularities in the dimensions of these phenomena have been accurately ascertained.

R. C. JOHNSON

19, Catherine Street, Liverpool

Sun Pillar of April 6, 1883

It may be of interest to record the various points from which the above phenomenon was seen. I was at St. David's with a party of geological students, and we watched it for some time as we were returning from the coast at sunset.

Cambridge

THOS. MCKENNY HUGHES

Fibreballs

I READ with much interest the letters of Prof. G. H. Darwin and "J. H.," NATURE, vol. xxvii, pp. 507, 580. On the coast of South Australia, especially on the Coorong beach, I have seen fibreballs in great quantity; some larger than a cricket ball, and perfectly spherical, hard, and well-matted; others tapering and having the form of an exceedingly long ellipse. I brought home many specimens. These are now in the Wragge Museum at Stafford; and I shall be happy to have some forwarded for Prof. Darwin's inspection.

Fort William

CLEMENT L. WRAGGE

Helix pomatia

ONLY a few more lines to say, in consequence of the communication of Mr. Stokoe in your last number (p. 6), that he will find the mollusca in their geological relations treated in the introduction to my work on "British Conchology," vol. i. p. cix. The distribution of *H. pomatia* in this country and on the Continent is noticed in pp. 177 and 178 of that volume, and in the supplement to the fifth volume.

J. GWYN JEFFREYS

1, The Terrace, Kensington, May 4

I HAVE found this freely in the hedge-bottoms of Hertfordshire lanes, where the soil was a dark alluvial mould, certainly not cretaceous. I suspect that even in its known localities it is very local.

HENRY CECIL

Bregner, Bournemouth, May 5

IN two of the localities mentioned for this snail—Dorking, Surrey; and Woodford, Northamptonshire—there seems some reason to suspect it to be a modern introduction. From 1849

to 1852 I lived within two miles of Woodford, and often found the shells in a small wood known as Woodford Shrubbery. It was commonly said in the neighbourhood at that time that the snails were brought from abroad by the gentleman—I think General Arbuthnot—who had formed the Shrubbery some thirty years before that date.

I also found, many years ago, shells of the same species about the foot of Box Hill, near Dorking, and was told by a former resident in that neighbourhood that the snails were brought from Italy by Mr. Hope, of Deepdene, who was well known in the early part of this century as a writer on the mediæval architecture of Italy. I give the statements for what they may be worth.

Loughton

J. C.

Intelligence in Animals

IN addition to the long list of "emotions which resemble human intelligence as occurring in animals below the human species," as given by your correspondent on the authority of Dr. Romanes (NATURE, vol. xxvii, p. 580), and the instance of "benevolence" subsequently cited, I venture to submit the following as illustrating something very like the emotion of contempt.

Until recently our domesticated animals included two cats—one a very fine tabby (a trimmed male) of somewhat morose nature, and a pretty little black cat, a half-bred Persian (a female) of very gentle character. On a noticeable occasion the tabby cat caught a mouse and ate it all up with much relish in a corner of the room. The proceeding was watched with much interest by the black cat from her place on the hearthrug. After the tabby had finished his repast he also took up his place on the hearthrug. The black cat then went over and smelled the spot where the dainty morsel had been devoured. Upon this the tabby cat came up and "boxed" the black cat's ears once or twice, as who should say, "What business have you with my affairs? catch your own mice!"

W. R. HUGHES

Handsworth Wood, near Birmingham, May 5

MAY I contribute another case of higher thought in the lower animals. At the farm of Granton Mains, near Edinburgh, an old cat had become blind; her daughter had kittens. The daughter was observed bringing in a sparrow to the boiler-house, where her blind mother and her half-grown kittens were warming themselves; the kittens came up to get the sparrow, but their mother kept them off and gave the sparrow to her mother, and watched whilst she ate it. She was frequently seen to give other food to her blind mother.

My children have a fox terrier bitch, "Dot." Dot loves to kill anything from a cat to a mouse, and sometimes a wild rabbit gets into the garden, and it is a red-letter day for Dot and the children. But the children have also tame rabbits; of course any one who knows dogs will understand that it is simple to teach them not to touch pets—for instance, the cat of their own house. But Dot had a curious case to decide. The children had found a nest of wild rabbits, and two of the tame rabbits (black and white) had made a hole in a bank and there had young ones. This nest was respected by Dot. The children took the young wild rabbits (gray) and fostered them on the tame ones by slipping them into the nest. A few days after this, Dot must have discovered these gray young ones with the black and white. Had she found them anywhere else, one snap, and they were dead; but this was the line she took: she was found at the front door under the porch with one of the young gray rabbits, quite fifty yards from the nest; it was quite unhurt, although it died afterwards, I believe from cold and exposure at the time. Are we to suppose that Dot wished to ask the question, "May I kill this gray one?"

DUNCAN STEWART

Knockrioch, May 2

THE SOLAR ECLIPSE OF 1883

THIS eclipse, as our readers have already been made aware, took place on Sunday last, and we may hope, although we shall not know for more than a month, that the weather was favourable. We shall not hear whether the French arrived in time, but we do know that the English observers met the American party, consisting of Prof. Holden, Dr. Hastings, Mr. Rockwell, Mr. Preston,

SIDEROSTAT.						EQUATORIAL.				PHOTOHELIOGRAPHS.	
Time.	Hilger.	Rowland grating.		Prismatic camera.	Slit Spectro-scope. 2 prism.	7 prism. F.	Grating.		1/4 in. slide. Dense prism F.	Large photo-heliograph.	Corona camera.
		1st order.	2nd order.				F. Red 1st order.	F. Blue 2nd order.			
<i>Before Totality</i>											
Minutes.											
10						expose	expose	expose			
9											
8											
7									expose		
6	ref. spectrum 30 sec.								expose		
5									expose		
4									expose		
3							expose	expose	expose		
2						expose			expose		
Seconds.											
60									expose		
40		expose	expose				run 1/4 in.				
20		expose	expose								
2	expose & start clock										
1											
<i>Totality</i>		expose	expose	expose col. plate	expose	expose	expose	expose	expose	expose	expose 1 sec.
280											expose 20 sec.
230				shut							
220				expose gel. plate							expose
210									expose	expose	
200		expose	expose								
120				shut							
110				expose col. plate							
100											
90											shut
70										expose	expose 3 sec.
50											
40											expose 10 sec.
20											expose 2 sec.
Just before end		expose	expose	shut	shut	expose	expose	expose	expose	shut	
<i>After Totality</i>											
Seconds											
1							run 1/4 in.				
4		expose	expose								
10		expose	expose								
Minutes											
1		shut	shut				expose	expose	expose		
2	shut										
3											
5						expose	expose	expose	expose		
7									expose		
9						shut	shut	shut	expose		
10									shut		
	refs. 25				2 sec.	10 sec.	10 sec.	10 sec.	1 sec.	run	run

Lieut. Brown, and Mr. Upton, the first mentioned astronomer being in charge, at Panama. They expected to arrive at Callao on the 20th March last, and to leave either in the *Hartford* or the *Pensacola* within the next few days: That would give them ample time to reach the Caroline Islands, and make the arrangements necessary for the observation. It was the intention of Prof. Holden to take the combined English and American party on to Flint Island if he found that Dr. Jannsen had already established his party on Caroline. This, of course, was a very proper decision, as it would double the chances of favourable weather. We give the time-table for observation supplied to the English observers, which they were instructed to carry out down to its most minute detail, if all the instruments were landed and set up without damage.

It will be seen that the English attack was to be entirely photographic; no eye observations were to be made. And if all has gone well, something between fifty and

sixty photographs may be hoped for. The table perhaps requires a little explanation, which we will now proceed to give. It followed from work undertaken with that special object in Egypt last year, that eclipse observations can now definitely begin ten minutes before totality, and end about ten minutes after. With an eclipse therefore of about five minutes' duration, as in the present case, the work ranges over a period of five-and-twenty minutes, and if the plates are as sensitive as they can now very well be, it is quite easy to see that a very large number of photographs may be taken. The greatest interest of course attaches to the spectroscopic photographs to be taken by means of a siderostat and the equatorials. As in former eclipses the plates exposed in the photoheliographs will secure the appearance of the corona surrounding the image of the dark moon; but on the present occasion an attempt was to be made to take these photographs on a much larger scale than usual, a scale of four inches to the moon's diameter. Coming to the spectra themselves, we find

four spectroscopes fed by the light reflected by a siderostat of 30 cent. diameter, these four spectroscopes being bracketed together very much like a Gatling gun, and pointed to the siderostat, which has a very excellent clock attached to it. The first spectroscope, called the "Hilger," in the programme, is an integrating one, and will integrate for us the light of the whole region round the sun during the entire period of totality on a plate which is allowed to fall very slowly by means of a clock-work arrangement. If any change, therefore, takes place in the spectrum of these regions during this period, it will be recorded on this moving plate in historical sequence, so that, the beginning and end of exposure being known, the time at which any definite change takes place can be determined. The Rowland grating coming next on the list, which was generously given to Mr. Norman Lockyer by Professor Rowland, is one of ten feet focus, and has a large surface with 14,000 lines to the inch, forming of course a most excellent and simple prismatic camera, the first and second order spectra both being utilised. The prismatic camera and slit spectroscope of two prisms were two instruments arranged by Capt. Abney for the eclipse last year. They are on the model of the instruments designed for the eclipse of 1875 in Siam, but have the advantage of possessing plates which are sensitive to the whole of the spectrum. The work to be done by the equatorial is of a very similar nature to that to be attempted with the siderostat, except that it was intended by varying the time of exposure from long to very short periods to make certain of something. All the cameras, except the "Hilger," in which the plate moves by clockwork, are fitted with long plates, of which only small strips are exposed at a time, and the exposure is managed, not by changing the plate as in the ordinary method, but by turning a screw. The word "expose" in the table therefore shows the precise moment, at which, if the instructions are carried out, a new strip of plate will be exposed to the action of the light before, during, and after totality, and it will be seen that the exposures are varied both before and after totality, so as to get the greatest possible difference in time during which each part of the plate receives its impression. From a letter received by Mr. Norman Lockyer from Messrs. Lawrance and Woods, we know that the American astronomers intended giving them all possible facilities for carrying out the combined Royal Society and Solar Physics Committee's programme; and that the attention of the English observers will be concentrated on the siderostat and equatorials, as two officers of the American ship have been told off to work the photo-heliographs and look after the eclipse clock, which is so arranged that it keeps all the observers together by indicating to each one of them the exact number of seconds still left for his work, with the additional advantage that each number of seconds announced by the officer in charge is a distinct order to do a certain thing, as in the case of the various exposures indicated in the list.

LECTURES TO WORKING MEN

THE three courses of Lectures to Working Men given at the Museum of Practical Geology, Jermyn Street, during the present session, by the staff of the Normal School of Science and the Royal School of Mines, came to an end last Monday, and, as on former occasions, it gave rise to regret that more cannot be done in this direction, both with regard to the number of courses given, and the number of persons accommodated in each case. The theatre at Jermyn Street restricts the audience to something over 600, while of late years the applications for tickets have never been less than 2,000. The tickets for each course—for which sixpence is charged as a registration fee—are given only to *bonâ fide* working-men, who must bring with

them a paper on which is stated their name and occupation. Some of the lectures of the last course—that given by Mr. Norman Lockyer, on "The Earth and its Movements"—were listened to by the Japanese Minister, and an official connected with the Education Department of Japan. At their request a list was drawn up showing the trades of the audience. This list, in the case of 500 who attended the last course, we are permitted to give, and we think our readers will find it an interesting one. Seeing that there is this anxiety on the part of working men to learn, and that less than one in three of those so desirous of learning can have an opportunity of doing so, we trust that in future years the Lecture Theatre at South Kensington will be utilised in this direction, as well as that at Jermyn Street. There is little doubt, of course, that a Liberal Government, represented by the Treasury officials, naturally anxious in all ways to protect the public purse against all claims, whether good or bad, might object to this being done at the public cost, but seeing that the lectures are given as a labour of love by the various professors such an objection would scarcely be urged, and we confess too that we should not only like to see the theatre at South Kensington utilised in this way, but the theatres at University College, King's College, and other institutions that might be named. We do not believe that the professors at these institutions are less anxious for the progress of knowledge among the working classes than those who are connected with the Government School, and this being so, we may hope to see at some future time a united effort to supply what is at present a great want, and a gap in our educational programme.

Trades of 500 of the audience at the last course of Lectures to Working Men, April and May, 1883:—

- | | |
|----------------------------|----------------------------|
| 1 Bag Maker. | 6 Iron Founders. |
| 6 Bakers. | 23 Instrument Makers. |
| 2 Basket Makers. | 37 Jewellers. |
| 28 Boot and Shoe Makers. | 1 Lamp Maker. |
| 1 Brewer. | 1 Lead Glazier. |
| 2 Brush Makers. | 3 Lithographers. |
| 1 Billiard Table Maker. | 1 Locksmith. |
| 6 Builders (Foremen). | 4 Stonemasons. |
| 1 Butler. | 1 Mattress Maker. |
| 3 Brass Finishers. | 2 Milkmen. |
| 2 Bricklayers. | 6 Opticians. |
| 7 Bookbinders. | 9 Pianoforte Makers. |
| 6 Cabinet Makers. | 3 Perfumers. |
| 52 Carpenters and Joiners. | 6 Photographers. |
| 8 Coach Painters. | 1 Picture Frame Maker. |
| 9 Compositors. | 16 Plumbers. |
| 8 Carvers. | 2 Pocket Book Makers. |
| 1 Cigar Maker. | 2 Polishers. |
| 4 Chemists and Druggists. | 10 Porters and Messengers. |
| 13 Clerks. | 6 Portmanteau Makers. |
| 3 Carriers. | 6 Plasterers. |
| 6 Dentists. | 1 Quarryman. |
| 4 Designers. | 6 Salesmen. |
| 1 Die Sinker. | 5 Saddle & Harness Makers. |
| 1 Draper. | 1 Saw Maker. |
| 2 Draughtsmen. | 1 Soda Water Bottler. |
| 25 Engineers. | 7 Shop Assistants. |
| 2 Engravers. | 4 Stationers. |
| 1 Envelope Maker. | 1 Smith. |
| 1 Fishing Rod Maker. | 1 Stoker. |
| 5 Gasfitters. | 2 Storekeepers. |
| 1 Gardener. | 17 Tailors. |
| 7 Gilders. | 4 Teachers. |
| 1 Greengrocer. | 1 Traveller. |
| 2 Grainers. | 6 Tinmen. |
| 3 Glasscutters. | 5 Turners. |
| 4 Gun Makers. | 1 Twine Spinner. |
| 7 Hatters. | 2 Umbrella Makers. |
| 1 Hairdresser. | 6 Upholsterers. |
| 1 Hinge Maker. | 8 Watch Makers. |
| 1 Hammerman. | 1 Warehouseman. |
| 1 Hemp Dresser. | 3 Wheelwrights. |
| 23 House Painters. | 7 Zinc Workers. |